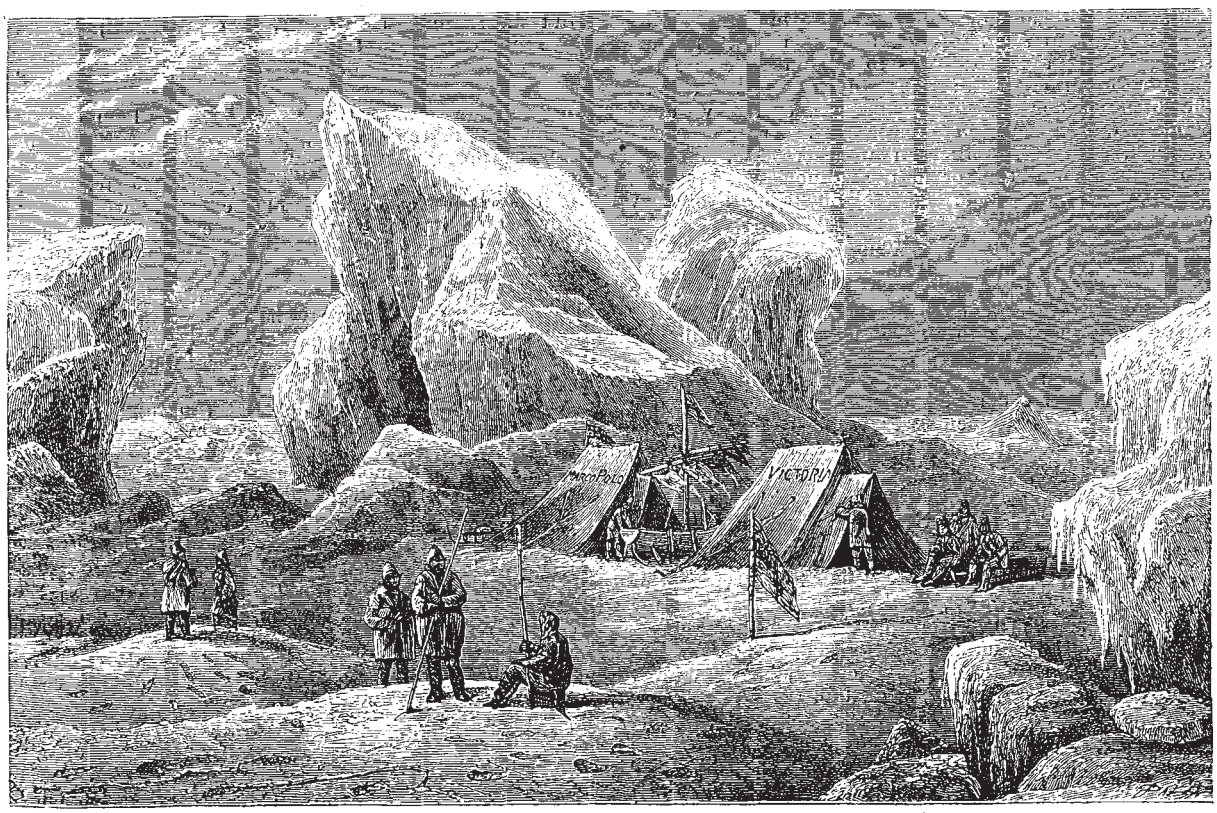
THE GREAT FROZEN SEA [1]

MANY readers, we believe, will prefer this brief brightly written narrative of the last English Arctic Expedition to the two weighty volumes of Sir George Nares's, recently noticed in these pages. Capt. Markham is an enthusiastic Arctic explorer, and as these volumes testify, is well fitted by his personal qualities, his experience, and accomplishments, to take a leading part in work of this kind. He has evidently a thorough knowledge of Arctic work and a full appreciation of the kind of observations which ought to be attended to in an Arctic expedition. His interesting volume affords a very satisfactory idea of the incidents of the expedition and of the nature and amount of work done.

Capt. Markham's name must be known to all as the leader of the sledge party that attained the highest northern latitude, and as might be expected, his pages contain an impressive narrative of the adventures of the party. As one reads the story of this heroic attempt to reach the pole he is not merely surprised that the party turned when they did, but that they did not resign the attempt at the end of the first week, for it must then have become evident that the goal was unattainable by that route at that season with the means at command. Had the men not been made of splendid stuff, physically and morally, they could not possibly have endured the terrible hardships described by Capt. Markham. Certainly Sir George Nares did not exaggerate when, in addressing his men before leaving England, he told them "that if they could imagine the hardest work that they had ever been called upon to perform in their lives intensified to the utmost degree, it would only be as child's play in comparison with the work they would have to perform in sledging."

Capt. Markham seems to think that work by the



Highest northern camp, 33° 20′ 26″ N. lat.

Smith Sound route is practically complete; and he leaves one with the impression that it would be useless to attempt to reach the pole by that route. Assuming that the attainment of the pole is in itself a worthy object for an expedition, we are inclined to think that the conclusion as to its unattainability has been too hastily drawn from the experience of one expedition. At the same time we quite agree with Capt. Markham that there are other routes which, while they hold out some hope of a successful passage to the pole, would also afford opportunities of obtaining valuable scientific observations. Capt. Markham rightly says that Behring Strait is a portal leading to a vast region, the history of which has hitherto been as a sealed book. This, it is stated, is the route to be followed next year by the expedition to be sent out by Mr. Gordon Bennett. Mr. Bennett is having a map of the polar regions constructed for the purpose of showing the effect of the various currents towards and from the polar area, and, if one may judge from this, there is much to say in favour of the Behring Strait route; but all such polar-current charts must be regarded with grave suspicion, as being founded so largely on conjecture. We quite coincide with Capt. Markham's strong advocacy of the route by Franz Josef Land. So far as known at present, that, we think, is the best basis of operations for further work towards the north. Perhaps we may hear of something important being done in this direction by the Dutch Expedition which recently went out in the *Willem Barentz*.

Capt. Markham gives a fair idea of the kind of scientific work carried on by the expedition, and we hope that the many magnetical, hydrographical, meteorological,

[1] The Great Frozen Sea. A Personal Narrative of the Voyage of the *Alert* during the Arctic Expedition of 1875-76. By Capt. A. H. Markham, R.N. (late Commander of H.M.S. *Alert*). (London: Daldy, Isbister, and Co. 1878.)

and other physical observations which were made will be published in well-arranged form. At the furthest point reached, a bread bag filled with the scrapings of the pannikins and a little pemmican was lowered to the bottom of the sea, and, having been kept there for some hours, was hauled up, and was found to be almost alive with numerous small crustaceans and foraminifera. With the thermometer a series of temperatures was taken at every ten fathoms, while the specific gravity of the surface-water was also obtained. Tidal action was apparent, though it was impossible to collect any exact data.

Capt. Markham, like his relative, Mr. C. R. Markham, is evidently of opinion that the Eskimo entered America from Asia, spreading eastward, and finding their way to Greenland by crossing at almost 81° 54′. This is, we confess, the theory which most readily presents itself, but those who have studied the subject most deeply, and in all its aspects, have come to the conclusion that the Eskimo are virtually indigenous, and came northwards from the American continent itself, the migration being from America to Asia, and not the other way. Indeed, some ethnologists go so far as to maintain the essential unity of origin of all the American families, and that all the differences in physique, language, &c., may be explained by differences of environment. In the case of America, probably, more than anywhere else, language is a really important factor in the ethnological problem. (See Prof. Sayce's article last week on "The Ethnology of North-West America.")

Capt. Markham gives an extremely pleasant account of the winter amusements on board the *Alert*—the Royal Arctic Theatre, the Thursday Pops., the school for the men, &c. The last-mentioned institution appears to have been a great success, and we are sure the men will feel the benefit of it all their lives. One feature of the Thursday Pops. we must mention with special approval; except on the evenings exclusively devoted to the legitimate drama, these entertainments were always preceded by a lecture delivered by one of the officers on some interesting and at the same time instructive subject, adapted to the knowledge and intelligence of the audience. In this way thirteen lectures were given altogether, and with the exception of one on a historical subject by Mr. White and one on Sledging Experiments by Capt. Nares, they were all on scientific subjects. Capt. Nares began the series by a lecture on Astronomy, which was followed by lectures by the other officers on Magnetism, Geology, Meteorology, Steam, Mock Moons under the Microscope, Light, Astronomy again, Food in the Arctic Regions, Arctic Plants, Hydrostatics. Indeed it is difficult to conceive that more could have been done to enable the expedition to pass as cheerful a winter as possible under the circumstances.

Altogether Capt. Markham's work is a thoroughly interesting and instructive narrative of a memorable expedition. The numerous illustrations and the maps add considerably to its value.

ON THE STRUCTURE AND DEVELOPMENT OF THE SNAKE

IN my paper on the skull of this type (see abstract *Proc. Roy Soc.*, January 10, 1878, pp. 13-16) I spoke of the snake as "lying at the very base of the *gill-less* vertebrata, and possessing a skull at once the simplest and yet the most curiously specialised," of any of the many kinds I have worked out.

As far as existing forms of reptiles are concerned, the snake does lie at the *very base*, yet, on the whole, I am inclined to add it to the other limbless lizards, such as the blind-worm and the amphisbæna, and to consider it, therefore, as a lizard which has had its limbs starved out for special purposes.

Much of the cranio-facial axis of the snake remains in a very primordial condition, but the outworks of the skull are modified to such a degree that "the power of nature could no further go."

I have not yet worked out the skull in the amphisbænidæ, but I expect to find it to have many things in common with that of the serpentiform amphibia, the "Cœcilians."

But the "Anguidæ," taking the common blind-worm (*Anguis fragilis*) as an example, are merely "Scincoids" that have dropped their limbs but retained their limb-girdles: they are *lizards* to all intents and purposes, and the native kind only differs from its quadrupedal relatives, in possessing an additional segment ("mesopterygoid") in the "pterygo-palatine" arcade, a segment common in osseous fishes and birds, but suppressed, as a rule, in the scaly reptiles.

As to that which is *archaic*, the chameleons so common in Africa, and the unique New Zealand Hatteria (*Sphenodon*), these outliers of the lizard tribe are evidently more generalised than the serpents.

But all these forms—snake, tropical lizard, legless lizard, and old aberrant lizards—all these come as close to the bird as the *pupa* of a dragon-fly does to the *imago* of the same insect.

With regard to the earlier stages and to the mode of development of the embryo, generally, I have stated in my paper (pp. 9 and 10), that "As to the general embryological study of the snake's embryo, it may be remarked that it is almost exactly that of the birds. Comparing my own observations on this low type with the results given in the study of the chick in Foster and Balfour's excellent work, I find that few paragraphs in it would need any material alteration, and that the figures would mostly serve very accurately if in that work the word *chick-* were to be exchanged for that of *snake*-embryo. The development of the vesicles of the brain, the organs of special sense, the rudiments of the cranium and face—those things that come across my path, to say nothing of the rest of the growing germ, all are developed similarly in the snake, below, and in the bird, above."

If this be so, the modifications undergone afterwards, in the specialisation of the skull and skeleton generally, and in the appearing and packing of the enclothing muscular masses, those "cunning machines" that do the gymnastics of the body—the development and endless modifications of these parts must be of the greatest interest.

I must refer to Professor Huxley's paper "On the Classification of Birds" (Zool. *Proc.*, 1867, pp. 415-418) for a comparison of the bird with the reptile, and for the reasons existing that have led modern anatomical zoologists to put the reptiles and birds into one group, viz., the "Sauropsida."[1]

With regard to the loss of limbs it is not a little remarkable that, on the theory of the "Ratitæ" being parental to the "Carinatæ," in the bird class, that pair of limbs which was to be most metamorphosed was not quickened into new life until it had died. Morphogically, the wingless *Dinornis* stands directly beneath the whole of the "winged fowl" known to us, and the steps and stages from that monster up to the sun-bird and the humming-bird are very gentle and gradual.

But there were *reptiles* in the olden times "that spread their limber fans for wings," and there were true birds also which had evidently only just escaped from the reptilian territory, as the *Archæopteryx*, for instance, and these are seen to be actually modifying the paw into a *wing*.

Perchance the birds grew out from many a kind of old generalised reptile; yet, be this as it may, the eagle himself is not a more powerful or beautiful creature than a python or a boa, nor is there much more to wonder at in

[1] That account of the "Sauropsida" needs a little modification in the light of newer discoveries. I have given such an *improved* account in my article on the Anatomy of Birds in the ninth edition of the "Encyclopædia Britannica," vol. iii., p. 278.